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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Prough, et al. Attorney Ref.: 2065.005A
Serial No.: 10/042,718 Group Art Unit: 1731
Filed: July 16, 2002 Examiner: To be assigned
Title: **SYSTEM AND METHOD FOR IMPROVING THE MOVEMENT AND
DISCHARGE OF MATERIAL FROM VESSELS**

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To: Commissioner for Patents
Box Non-Fee Amendment
Washington, D.C. 20231

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TC 1700

Preliminary Amendment Under 37 C.F.R. 1.115

Dear Sir:

The Applicant respectfully requests that the following amendments be entered prior to examination of the above-referenced application.

AMENDMENTS

Prior to examination, please amend the above-identified application as follows:

In the Claims

Please delete claims 2 and 26.

Please replace claims 1 and 25 with the following amended claims 1 and 25.

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1. [Amended] A system for improving the movement of material in a vessel, the vessel having an inlet, an outlet, a cylindrical portion having an outer dimension, and a converging transition between the cylindrical portion and the outlet, the system comprising:

means for introducing at least some liquid to the converging transition at a location having a diameter greater than about 90% of the outer dimension of the cylindrical portion of the vessel.

25. [Amended] A digester for treating comminuted cellulosic fibrous material, the digester comprising:

an inlet for introducing comminuted cellulosic fibrous material;
a circular cylindrical portion having an outer diameter;
an outlet for discharging treated comminuted cellulosic fibrous material;
a converging transition between the circular cylindrical portion and the outlet;
and

means for introducing at least some liquid to the converging transition at a location having a diameter greater than about 90% of the outer diameter of the circular cylindrical portion of the digester.

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REMARKS

The Applicant respectfully requests entry of the above amendments, and consideration of the application, as amended. No new matter was introduced.

Attached hereto is a marked-up version of the changes made to the Claims by the current amendment. The attached page is captioned **Version with markings to show changes made.**

In the following discussion, the Applicant references the excerpt from a manual entitled Digester Update, 10th Edition (herein "the Digester Update") submitted in the Information Disclosure Citation filed herewith. The Digester Update is a manual prepared by Andritz Inc. of Glens Falls, NY (once known as Ahlstrom Machinery, Inc., which was once known as Kamyr, Inc.). As one of only two designers and suppliers of continuous digesters in the world, Andritz Inc. are experts in the design and operation of continuous digester vessels. Andritz Inc. regularly produces and distributes manuals, such as the Digester Update, to advise their customers on the proper operation of their continuous digester vessels and related equipment and to inform their customers of their latest developments in this field.

The Applicant submits that the prior art, for example, the prior art identified in the Information Disclosure Statement filed herewith, does not anticipate the present invention as recited in the present claims as amended. None of the prior art discloses means for introducing at least some liquid to the converging transition at a location having a diameter greater than about 90% of the outer dimension of a vessel. The prior art does not anticipate the present invention.

Moreover, the Applicant submits that the present invention as recited in the present claims, as amended, is not obvious in view of the disclosures and teachings of

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the prior art. The Applicant submits that counterwash nozzles are recognized features of the art of continuous digesting of wood to make cellulose pulp. As illustrated in Figures 4.1 and 4.2 in the Digester Update, counterwash nozzles are typically positioned in the lower head of a continuous digester. As described in paragraph 1 under the heading "B. Counterwash Nozzles" on page IV-2 of the Digester Update, the addition of liquid to the lower head via the counterwash nozzles "Improves the liquor distribution to the bottom of the digester to give better control of the outlet device load and the blow line consistency." The Applicant reminds the Patent Office that this function of counterwash nozzles is the function defined by Andritz Inc., a company with a long history in this field and who are recognized as experts in this field.

In the art of continuous digesting the "outlet device" is the rotating, armed assembly positioned in the bottom of the digester that promotes movement of material through the outlet of the vessel. The "load" on the outlet device, as indicated by the amps drawn by the motor turning the outlet device, is typically an indication of the ratio of the solids content of the slurry to the liquid content of the slurry being discharged. The lower the ratio, the more diluted the slurry, and the lower the resistance to turning the outlet device and the lower the load on the outlet device. In addition, in this art, the weight ratio of the solids content of the slurry to the liquid content of the slurry is referred to as the "consistency" of the slurry. Thus, according to the teachings of the prior art as recited the Digester Update, liquid is introduced via counterwash nozzles to effect changes in consistency, or the solids-to-liquid content, of the slurry discharged from the digester vessel.

The Applicant submits that since the problem addressed by the present invention is not recognized in the prior art, the present invention cannot be obvious in view of the prior art. As discussed above with respect to the Digester Update, and also in paragraph 0018 of the present application, in the existing art, liquid is introduced by means of counterwash nozzles to effect variation in consistency of the slurry being discharged. However, according to the present invention (as also described in

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paragraphs 0020-0022 of the present application), introducing liquid at the proper location in the bottom head of a vessel can improve the treatment of the material in this zone of the vessel and the operation of the vessel. The inventors recognized for the first time that compression and stagnation in the zone where the direction of material flow changes from essentially a vertical flow to essentially a non-vertical flow can negatively affect the distribution of treatment liquids and treatment temperatures in this area and impair the operation of the digester. The Applicant submits that this potential problem in the art is not recognized by the prior art and was only discovered through experiments performed by the inventors. For this reason alone, the present invention is not obvious in view of the prior art.

After recognizing this potential problem, the inventors proposed the present invention as one effective method of addressing the problem. As described in the present application, the inventors discovered that by introducing a liquid to this region of flow transition, flow stagnation and compression of material can be reduced. This reduction of flow stagnation and compression, among other things, permits a more effective distribution of treatment liquids and treatment temperatures in this transition region. The inventors also discovered that varying the flow of liquid through one or more counterwash nozzles, for example, at a location at 83% of the vessel diameter or less, did not effect the desired improvement in treatment of the material and operation of the digester, as did aspects of the present invention. The inventors now recognize why the prior art methods do not effect desired results, as will be discussed below. Again, since the prior art does not recognize the effect of introducing liquids in this region of the lower head of a vessel upon the treatment of the material in the vessel and the operation of the vessel, the present invention cannot be obvious in view of the prior art.

Further still, the location of counterwash nozzles in the prior art does not and cannot effect the advantages obtained by aspects of the present invention. Among other things, the introduction of liquid to a vessel head as disclosed by the prior art, for

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example, at a diameter of 83% or less of the diameter of the vessel, does not and cannot introduce liquid where it could provide the benefits that are achieved according to the present invention. Specifically, at the diameter of the zone of transition in flow direction, the hydrostatic pressure and compression of the material are greater than in regions elsewhere in the head of the vessel, that is, the local pressure increases in the vessel head as the radius of the location in the vessel head increases. As a result, the liquid introduced at a diameter within the diameter of the increased pressure, for example, at a diameter 83% or less of the diameter of the vessel, cannot flow to the regions of higher pressure where the liquid is most needed according to the present invention, for example, at a diameter 90% or greater of the diameter of the vessel. That is, by introducing liquid at a diameter inside the area of the head where the compression is greatest, the liquid introduced is prevented from migrating to the area of compression and stagnation by the higher pressure inherently present in this area. The liquid will flow away from such areas to areas of lower pressure. Thus, the prior art methods of introducing liquids to the lower heads of vessels cannot introduce liquid to the areas where the liquid is desired according to the present invention. Thus, lacking the teachings of the present invention, there is no teaching or motivation in the prior art to increase the diameter of the location where liquid is introduced. Again, the present invention is not obvious in view of the prior art.

Thus, the Applicant submits that the prior art does not disclose or practice the invention of the present claims as amended, the prior art does not address the problem addressed by the present claims as amended, and the prior art does not even recognize the problem addressed by the present claims as amended. Again, the Applicant submits that the present invention is not anticipated by the prior art and is not obvious in view of the disclosures and teachings of the prior art.

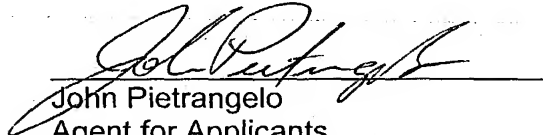
The Applicant believes that the present claims as amended are in condition for allowance. An early and favorable action on the merits of the application is requested.

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If a telephone conference would be of assistance in advancing prosecution of the subject application, the Applicant's undersigned agent invites the Examiner to telephone him at the number provided.

Respectfully submitted,


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January 30, 2003

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claims 2 and 26 have been deleted.

Claim 1 has been amended as follows:

1. [Amended] A system for improving the movement of material in a vessel, the vessel having an inlet, an outlet, a cylindrical portion having an outer dimension, and a converging transition between the cylindrical portion and the outlet, the system comprising:

means for introducing at least some liquid to the converging transition at a location having a diameter greater than about [75%] 90% of the outer dimension of the cylindrical portion of the vessel.

Claim 25 has been amended as follows:

25. [Amended] A digester for treating comminuted cellulosic fibrous material, the digester comprising:

an inlet for introducing comminuted cellulosic fibrous material;

a circular cylindrical portion having an outer diameter;

an outlet for discharging treated comminuted cellulosic fibrous material;

a converging transition between the circular cylindrical portion and the outlet; and

means for introducing at least some liquid to the converging transition at a location having a diameter greater than about [75%] 90% of the outer diameter of the circular cylindrical portion of the digester.